NOAA Teacher at Sea
Karolyn Braun
Onboard NOAA Ship KA'IMIMOANA
October 6 – 28, 2006

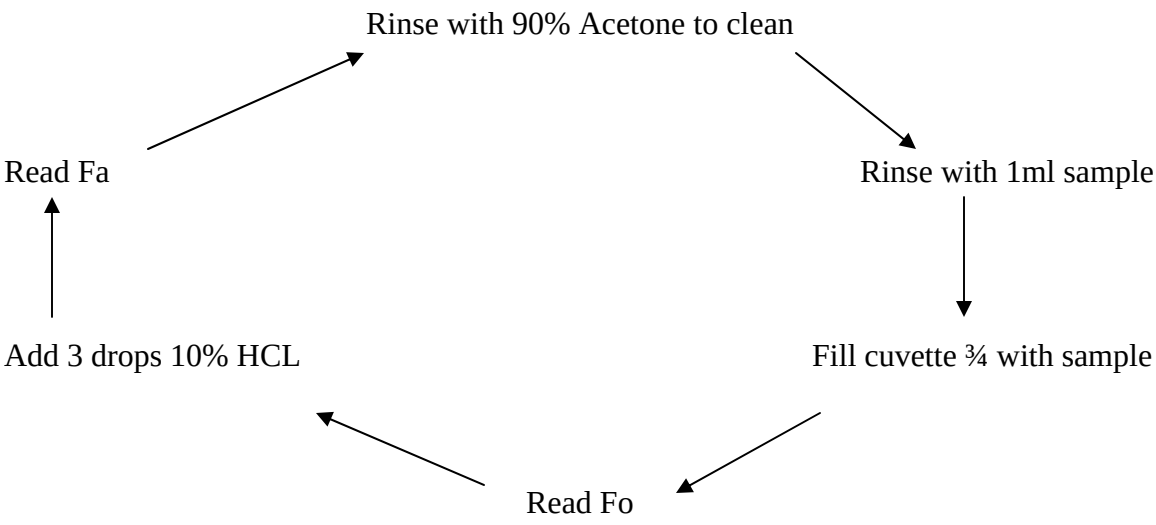
NOAA Teacher at Sea: **Karolyn Braun**
NOAA Ship KA'IMIMOANA
Mission: TAO Buoy Array Maintenance
Wednesday, October 18, 2006

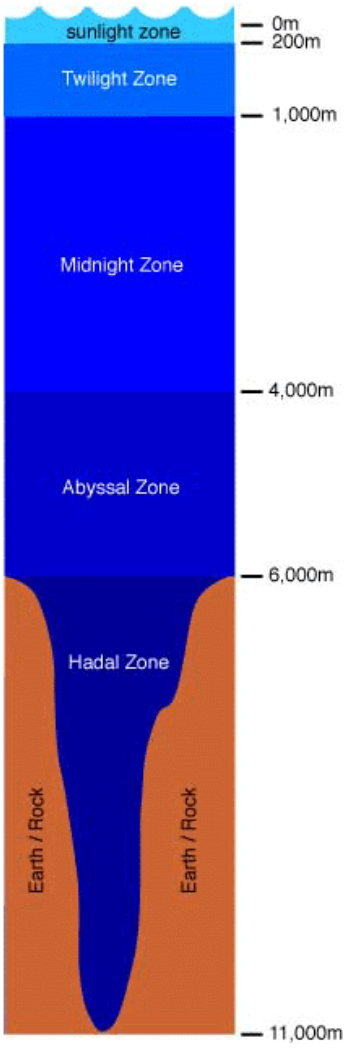
Plan of the Day
Transit;
TAO buoy painting;
Testing CTD samples using the Fluorometer

Woke up at 5am to get a head start on the painting. I'd rather work in the morning before the sun comes up. I finished painting the white strips before breakfast so the crew could flip the buoys over to paint the red on the bottoms before the end of the day. I spent most of my day in front of the Fluorometer testing the CTD water samples.

TAS Braun using the Fluorometer to test CTD water samples.

Ok Learning time:
To calculate chlorophyll you need to use the following equation:
Chl (ug 1) = F*Ve((Fo-Fa)/S)Vf
Where F = fluorometer calibration factor
Fo = total fluorescence
Fa = Fluorescence after acid
Ve = extract volume (acetone extract; 10ml)
Vf = filtration volume (volume of filtered seawater in liters; 0.528L
S = sensitivity
To obtain Fo we need to fill the cuvette, a test tube-like glass beaker, and place into the Fluorometer. Record data. Then add 3 drops of 10% HCL to cuvette while still in the fluorometer. Re-read the fluorescence at the same sensitivity setting. Record data. Making sure in between samples the cuvette is cleaned with acetone. In summary





In completing the equation, we discovered that out here most of the chlorophyll is deeper then in most places. Let's get to the basics. The ocean can be divided into five broad zones according to how far down sunlight penetrates:

- The epipelagic, or sunlit, zone: the top layer of the ocean where enough sunlight penetrates for plants to carry on photosynthesis.
- The mesopelagic, or twilight, zone: a dim zone where some light penetrates, but not enough for plants to grow.
- The bathypelagic, or midnight, zone: the deep ocean layer where no light penetrates.
- The abyssal zone: the pitch-black bottom layer of the ocean; the water here is almost freezing and its pressure is immense.
- The hadal zone: the waters found in the ocean's deepest trenches.

Plants are found where there is enough light for photosynthesis; however, animals are found at all depths of the oceans though their numbers are greater near the surface where food is plentiful.

So why is more chlorophyll found deeper the further you travel away from the equator? Well my hypothesis is because all the nutrients are found in the deep cold layers of the midnight zone. Near the equator and near coastlines upwelling occurs so the nutrients are brought up to the sunlit zone. As you go further away from the equator less and less upwelling occurs so the phytoplankton is unable to thrive in this sunlit zone. The phytoplankton will grow deep enough in the twilight zone to obtain the nutrients, yet shallow enough where photosynthesis can occur. I also think that like land plants, too much sun can reduce the growth of the phytoplankton.

Chlorophyll fluorescence is often reduced in algae experiencing adverse conditions such as stressful temperature, nutrient deficiency, and polluting agents. Phytoplankton photosynthetic efficiency is one of the biological signals that rapidly reacts to changes in nutrient availability as well as naturally occurring or anthropogenically introduced toxins (contaminants). The results can be used as an indicator of system wide change or health. I finally finished the samples around 3 p.m. Got in a work out, watched a movie and was off to bed but not before we retarded our clocks 1 hour. We are now entering my normal time zone. So close to American Samoa yet so far away☺